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Fractures of Long Bones?**

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WHEN SHALL WE OPERATE ON SIMPLE FRACTURES OF LONG BONES?

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The surgeon can no longer be content with imperfect results in the treatment of fractures. The x-ray has been productive of much discontent. We shall wish always for perfect results. Perfection is not always easily secured. Inasmuch as there are certain inconveniences and hazards inherent in operations upon simple fractures, we must often be satisfied with a result which is not perfect. The majority of fractures of long bones, treated in the best hands, are left to heal in a position which may be discovered to be imperfect by means of either the x-ray or the autopsy, if not by external examination.

When manipulation, traction and pressure have done all that they can, and satisfactory reduction has not been secured, the relaxing effect of a general anesthetic is called for. When this and other tentative expedients fail, operation is the next step. The mistake of laying down rules to be followed in all cases should not be made. This is important because the skill and facilities of surgeons vary.

The condition of the patient is also a factor in determining operation. So long as there is no subsequent defect of functions, or other disturbances, such as pain, most patients do not require a perfect result. The question of esthetics is always to be considered, but function is the main thing. An important reason for securing perfect results

lies also in the fact that some day the patient may be confronted by a radiograph of his lesion; and then, even though he had no other way of surmising that a perfect apposition had not been obtained, he may become a menace to the surgeon.

Assuming that the patient may command a fair



FIG. 1. Fracture of the surgical neck of the humerus. Upper end of lower fragment displaced *inward* into axilla.

degree of surgical skill, in what cases should operation be done? With how much displacement shall we not be satisfied?

The rule may be laid down that, any displacement which interferes with the function of bone, joint, muscles, vessels or nerves to such a degree as to be capable of discovery by the patient should

be corrected. It cannot always be determined how much this interference is going to amount to, but if there seems to be sufficient uncorrected displacement to bring about such disturbance, operation is called for. Such displacement near a joint, of course, is more important than when in the middle of a long bone.

In the clavicle, a certain amount of displacement is the usual result. When this is so great as to be



FIG. 2.—Same case as Fig. 1. Strong traction and outward pressure on lower fragment have been made under general anesthesia, and arms and shoulder put in plaster of Paris dressing. But little has been gained.

easily discernible to the eye, after the best possible non-operative correction has been secured, then operation is indicated.

In the humerus any transverse fracture with un-

corrected overriding should be subjected to operation. Otherwise, the rule above enunciated should be applied.

The same may be said of fractures of the forearm. At the lower end of the radius, I should say that operation is indicated, if the horizontal displacement is more than 20 per cent. of the thickness of the bone in the direction of displacement. Usually operation may be done to correct a displacement of 15 per cent. Whatever the displacement may be, if interferences of function is produced by it, its correction is called for.

In the femur, the above rule should apply, with the following exception: Oblique fractures, when well treated, heal with good functional results but some shortening; the patient may be conscious of this shortening, but operation is not called for to prevent or remedy it. Transverse fractures of the femur, with irreducible overriding, usually heal with good function. Non-union and, at the best, slow union, are common. The present possibilities of surgery offer so much that operation is indicated in these cases. By operating at once, end-to-end apposition may be secured; and the many disadvantages of lateral union obviated.

Fractures of the tibia and fibula usually heal with some displacement, varying from 10 to 25 per cent. of the thickness of the bone. This is obviated only by the use of the x-ray. The same may be said of angular displacement.

It is not within the province of this paper to discuss methods of reduction and retention of simple fractures, but the use of metal pins driven through the bone of each fragment as a means of making ex-

tension and counter-extension must be regarded as one of the most important expedients that has been applied in recent times.

Loose fragments of bone, becoming displaced and preventing satisfactory reduction, constitute a common demand for operations upon simple fractures.



FIG. 3.—Same case as Fig. 1. After operation. Operative exposure showed that the upper end of the lower fragment had been extruded outside of its periosteal envelope which had remained attached to the upper fragment, the cavity below the upper fragment being filled with solid blood clot. Reduction of this fracture would have been impossible without removing the blood-clot from the subperiosteal space which the lower fragment should occupy.

Manipulation and traction fail in these cases. A short piece of the femur or tibia, which has become interposed transversely between the two main fragments, not only produces deformity, and is rich with possibility of pressure disturbances, but is a

most potent factor in the production of non-union. Such fragments should be exposed, and, with the least manipulation possible, grasped with forceps and rotated back into position. The removal of loose fragments in such cases is often called for.

The direct methods of retaining bone-fragments in apposition must vary with each case. When two



FIG. 4.—Fracture of the surgical neck of the humerus with *outward* displacement of the fragment. In this case reduction was easily secured by traction without operation, and a good result obtained.

bones have been placed in natural position, their tendency is to remain there. In the oblique fractures, if the surfaces are without irregularities, they often slide out of position. In such cases, one or two bone pins are of service. By making a notch

to receive a point or by the employment of the principle of mortising, the fragments may be prevented from slipping away. A most important step in the open treatment consists in suturing closely and firmly the soft tissues around the fracture after apposition has been secured. By securely sewing

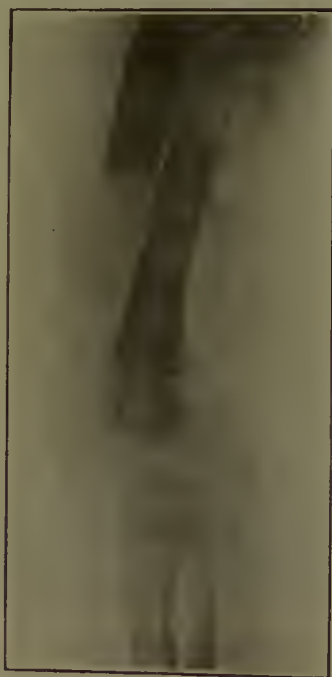


FIG. 5.—Showing transverse fracture of the femur. It is in such cases as this that an unjustifiable amount of force is required to effect reduction and maintain it. These cases are best treated by open operation and fixation at the beginning. Unless this is done, healing with over-riding, as here shown, will be the rule.

periosteum, fascia and muscle snugly around a fracture an efficient splint action is obtained.

Metal plates, screws and pins are indicated in some cases. My own preference is for absorbable materials. The plates advocated by Parkhill and Lane are of service in some of the large bones; but

even in most of these, the mortised ends for transverse fractures and the simple pin for oblique fractures are to be preferred. Strong chromic catgut or kangaroo tendon, in experienced hands, can be



FIG. 6.—In such displacements as here shown, no operation is indicated. Correction is secured by traction and pressure. Perfect correction cannot be obtained, but inasmuch as the tendency is towards inversion of the foot good function is secured. No fracture of the lower extremity should be permitted to leave the foot everted.

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